

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of Andrew McIntosh Soutar et al. Art Unit 1762
Serial No. 10/099,936
Filed March 13, 2002
Confirmation No. 3281
For SOLDERABILITY ENHANCEMENT BY SILVER IMMERSION PRINTED
 CIRCUIT BOARD MANUFACTURE
Examiner Brian K. Talbot

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APPEAL BRIEF

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This is an appeal from the final rejection of the claims of the above-referenced application made in the Office action dated October 6, 2005. A Notice of Appeal was filed on April 3, 2006.

The Commissioner is hereby authorized to charge the fee for the Appeal Brief in the amount of \$500.00 to Deposit Account No. 19-1345.

I. REAL PARTY IN INTEREST

The real party in interest is Enthone Inc., a corporation of the State of Delaware, owner of a 100 percent interest in the pending application.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any pending appeals which may be related to, directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal. The present application being appealed includes a Request for Interference with the following patents owned by MacDermid, Incorporated:

1. U.S. Pat. 6,200,451 (S.N. 09/251,641),
2. U.S. Pat. 6,444,109 (S.N. 09/698,370),
3. U.S. Pat. 6,544,397 (S.N. 09/821,205), and
4. Ser. No. 10/341,859 (now U.S. Pat. 6,905,587)

III. STATUS OF CLAIMS

Claims 18-26 and 32-40 remain pending in the present application. A copy of the pending claims appears in the Claims Appendix of this Brief.

The pending claims stand rejected under 35 U.S.C. §112 on the basis of the examiner's assertion that there is not support in the original disclosure for "fatty amides" which is an element of all of claims 18-26 and 32-40. It is also asserted that the original disclosure lacks support for "oxidant" which appears in claims 20, 23, 26, 34, 37, and 40.

The rejections of all of these claims are being appealed.

IV. STATUS OF AMENDMENTS

No amendments have been filed after the final rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The invention relates to plating of silver onto a metal surface to improve the solderability of the surface. The plating is achieved by so-called "immersion" plating which differs from electroplating because in immersion plating no external current is applied. The invention has special applicability to plating silver onto copper elements of printed circuit boards, to preserve their solderability for subsequent manufacturing operations.

Each of the independent claims in this application focuses on the specific tarnish inhibitors disclosed in paragraph [0072] of applicants' published application (2002/0150692), e.g.:

18. A process for improving the solderability of a metal surface, said process comprising treating the metal surface with an immersion silver plating solution, said solution comprising:

- a). a soluble source of silver ions;
- b). an acid;
- c). an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

The other independent claims are essentially the same with respect to the first salient issue on appeal -- whether "fatty amides" is supported by the original specification.

The second salient issue on appeal -- whether "oxidant" is supported by the specification -- is manifest in six of the dependent claims, e.g.:

- 20. A process according to claim 18 wherein the silver plating solution also comprises an oxidant.

The present application is a continuation of application 08/939,656, which is now U.S. Pat. 6,395,329. A parallel continuation issued as 6,860,925. A sample claim in 6,395,329 is as follows:

- 1. A method for coating a printed circuit board having metal pads, metal through-holes or a combination thereof, the metal pads, metal through-holes or the combination thereof being formed of a first metal, the method comprising the steps of:

contacting the metal pads, the metal through-holes or the combination thereof with a bright-etch composition to form etched pads, etched through-holes or a combination thereof, the etched pads, the etched through-holes or the combination thereof being formed of the first metal; and

contacting the etched pads, the etched through-holes or the combination thereof with a plating composition comprising ions of a second metal, the second metal being different from the first metal, and a tarnish inhibitor, the tarnish inhibitor characterized in that it coexists with the second metal in solution, to form

a printed circuit board having pads, through-holes or a combination thereof that are formed of the first metal coated by a separate layer of the second metal and by a layer of the tarnish inhibitor.

A sample claim in 6,860,925 is as follows:

1. A plating solution comprising: a solvent; metallic ions dissolved in the solvent; and a tarnish inhibitor in the solvent, the tarnish inhibitor characterized in that it does not cause the dissolved metallic ions to precipitate in the solution.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Office asserts there is no support in the original disclosure for "fatty amides" and "oxidant." These are the grounds for the rejection for which appellants request review. All 18 pending claims require "fatty amides"; only six pending claims require "oxidant":

A. Appellants appeal the rejection of the following 12 claims -- which require "fatty amides," *but not* "oxidant" -- on the basis that the Office's assertion is incorrect that original disclosure lacks support for "fatty amides":

18	19
21	22
24	25
32	33
35	36
38	39

B. Appellants appeal the rejection of the following six claims -- which recite "oxidant" and "fatty amides" -- on the basis that the Office's assertion is

incorrect that original disclosure lacks support for
"oxidant" and "fatty amides":

20 23

26 34

37 40

VII. ARGUMENT

A. Claims 18, 19, 21, 22, 24, 25, 32, 33, 35, 36, 38, and 39

These claims recite "fatty amides" but do not recite "oxidant," so the only rejection basis relevant to these claims is whether there is support in the original specification for "fatty amides." Written description support for "fatty amides" is found at page 22, line 13 [Paragraph 0072 of published application No. US 2002/0150692]:

"(a) fatty acid amines, preferably having at least 6 carbon atoms, most preferably at least 10 carbon atoms and generally no greater than 30 carbon atoms, they may be primary, secondary, tertiary, diamines, amine salts, amides, ethoxylated amines, ethoxylated diamines, quaternary ammonium salts, quaternary diammonium salts, ethoxylated quaternary ammonium salts, ethoxylated amides and amine oxides. Examples of the primary, secondary and tertiary amine type corrosion inhibitors are ARMEEN™ to (™ denotes trademark). Examples of the subsequent amine type corrosion inhibitors are respectively DUOMEEN™, ARMAC™/DUOMAC, ARMID™, ETHOMEEN™, ETHODUONEEN™, ARQUAD™, DUOQUAD™, ETHOQUAD™, ETHOMID™, AROMOX™, all supplied by Akzo Chemie." (Emphasis added.)

This same paragraph appears in the priority application, now 6,395,329, at column 10, line 10 ff, and at page 22, line 10 ff of the originally filed applications -- both present application 10/099,936, and 08/839,656 which matured into 6,395,329.

This paragraph states "they may be ... amides" "They" clearly refers back to the "fatty acid amines." So the "amides"

linked to the "fatty acid amines" by "they" must also be "fatty." An amide is, by definition, "a product of a reaction between a carboxylic acid and an amine." If an amine is "fatty," its corresponding amide must also be "fatty." That is, the reaction from an amine to an amide does not destroy the compound's long hydrocarbon chain, so the corresponding amide compound is also "fatty." It is asserted in the Advisory action that this is only "suggested." This is incorrect. By definition a "fatty amine" is derived from "fatty acid" and "[a]ll fatty acids are composed of a chain of alkyl groups containing from 4 to 22 carbon atoms...;" see, e.g., the attached definitions of "fatty acid" and "fatty amine" from *Hawley's Condensed Chemical Dictionary* (See Appendix).

Accordingly, one skilled in the art would understand "amides" at page 22, line 13 to be referring to amides which are, in fact, fatty, such that "fatty amides" is supported literally. And, in particular, one would understand applicants to have been in possession of the invention comprising silver plating with a composition comprising among other components, fatty amides, for solderability enhancement.

Moreover, even if the cited passage of the specification were deemed to fall short of literal support, claim language is supported if the disclosure "reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject matter." *Lampi Corp. v. American Power Products Inc.*, 56 USPQ2d 1445, 1455 (Fed. Cir. 2000). It is not necessary that the claim language such as "fatty amides" be supported in exact terms:

[W]e are mindful that appellant's specification need not describe the claimed invention in *ipsis verbis* to comply with the written description requirement. The test is whether the originally filed specification disclosure reasonably conveys to a person having

ordinary skill that applicant had possession of the subject matter later claimed. *In re Sorenson*, 3 USPQ2d 1462, 1463 (BPAI 1987).

The claim language under scrutiny in *Sorenson* included "copper complexes of imines," "binuclear copper complexes of carboxylic acids," and "a binuclear copper complex of an aliphatic carboxylic acid or binuclear copper complex of an aryl carboxylic acid." *Sorenson*, 3 USPQ2d at 1463. The examiner in *Sorenson* acknowledged that the specification contained broader expressions that encompassed the claim language at issue, including "an organic compound of copper", "copper complexes of carboxylic acids," "copper complex of an aliphatic carboxylic acid," and the "copper complex of an aryl carboxylic acid". The examiner nonetheless rejected the claims for failing to satisfy the written description requirement. The Board reversed and found that, although the specification did not use the exact language found in the claims, the disclosure as a whole reasonably conveyed to the skilled artisan that the applicant had possession of the claimed subject matter. *Id.* at 1463-64. Here, a skilled artisan reading the specification's disclosure of "fatty amines," which "may be...amides," would immediately recognize that applicants had possession of an immersion silver plating solution comprising a fatty amide additive. The written description requirement of Section 112 is satisfied.

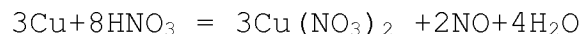
B. Claims 20, 23, 26, 34, 37, and 40

These claims require "fatty amides" and "oxidant." There is support for "fatty amides" for the reasons stated immediately above. Also, written description support for "oxidant" is provided, for example, by the numerous references in the original specification to "nitric acid" as a component of the plating composition (E.g., paragraphs 0086, 0103, 0123, and

0125). Nitric acid is a known oxidant and a known oxidant for copper:

U.S. PAT. 4,846,918, Col. 1, lns 58-64

In the nitric acid etching chemistry disclosed in U.S. Pat. Nos. 4,497,687 and 4,545,850, nitric acid reacts with copper according to the relationship



with the **nitric acid serving both as an oxidant and as an anion source for the dissolved copper.**

U.S. PAT. 5,362,712; Claim 1

1. . . . to dissolve the copper mold . . . **nitric acid is simultaneously used as said mineral acid and said oxidizing agent**

U.S. PAT. 5,037,482; Col. 5, lns 23 ff.

The oxidizer must be of a type, and present in an amount, sufficient to provide in cooperating interaction with the surfactant, a controlled conversion of the copper surface from a substantially smooth surface to a substantially clean, substantially uniformly micro-roughened surface, so that the bonding characteristics of the copper surface are substantially increased for securely adhering a subsequently applied coating to the copper surface, without at the same time removing the copper surface itself from the underlying substrate to which it is adhered. An oxidizing agent which is too active, and/or which is used in too substantial concentrations, not only runs the risk of uncontrolled stripping of the copper surface from its underlying substrate, but more importantly has been found ineffective to produce the required micro-roughened topography on the remaining **copper surface. Results such as this have been found with compositions containing nitric acid as the oxidizer.** Even where complete stripping is avoided, the remaining copper surface is nevertheless surprisingly smooth and unacceptable for promoting adhesion of subsequently applied coatings. [Nitric acid was discussed in the context of the prior art; and the inventors preferred methane sulfonic acid over nitric acid.]

Nitric acid in the context of these solutions is well understood to provide nitrate ions which facilitate oxidization of Cu to Cu⁺¹ and/or Cu⁺² by the most basic of chemical re-dox reactions.

In light of the state of the knowledge in the art, the specification's disclosure of "nitric acid" – a known oxidant for copper – reasonably conveys to the artisan that applicants had possession of immersion silver plating solutions comprising an oxidant. Therefore, the written description requirement of Section 112 is satisfied.

C. THE OFFICE HAS NOT MADE A *PRIMA FACIE* SHOWING

Because the written description requirement does not require in *ipsis verbis* support in the specification, the Office bears "the initial burden of presenting evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention defined by the claims." *In re Wertheim*, 191 USPQ 90, 97 (CCPA 1976); *In re Alton*, 37 USPQ2d 1578, 1583 (Fed. Cir. 1996); MPEP 2163.04.

The *Wertheim* court found that the Patent Office did "nothing more than to argue lack of literal support." *Wertheim*, 191 USPQ at 98. The court found this inadequate:

If lack of literal support alone were enough to support a rejection under § 112, then the statement of *In re Lukach* that "the invention claimed does not have to be described in *ipsis verbis* in order to satisfy the description requirement of § 112," is empty verbiage. *Id.* (citations omitted).

Here, the Office has not provided sufficient evidence or reasoning for concluding that the written description requirement is not satisfied for "fatty amides" or "oxidant."

More importantly, the disclosure "reasonably conveys to a person having ordinary skill that applicant had possession of the subject matter later claimed," i.e., of silver plating using compositions containing fatty amides and an oxidant to improve solderability.

D. Conclusion

Claims 18, 19, 21, 22, 24, 25, 32, 33, 35, 36, 38, and 39 should be allowed because there is adequate support in the specification for the term "fatty amides." Claims 20, 23, 26, 34, 37, and 40 should be allowed because there is adequate support in the specification for "oxidant" and "fatty amides." Appellants therefore respectfully request the rejections be reversed and these two groups of pending claims be allowed.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

Rejected claims under appeal: 18-26, 32-40.

18. A process for improving the solderability of a metal surface, said process comprising treating the metal surface with an immersion silver plating solution, said solution comprising:

- a). a soluble source of silver ions;
- b). an acid;
- c). an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

19. A process according to claim 18 wherein the silver plating solution also comprises material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives and benzimidazole derivatives.

20. A process according to claim 18 wherein the silver plating solution also comprises an oxidant.

21. A process according to claim 18 wherein the metal surface comprises copper.

22. A process according to claim 21 wherein the silver plating solution also comprises a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

23. A process according to claim 22 wherein the silver plating solution also comprises an oxidant.

24. An immersion silver plating solution comprising
(i) a soluble source of silver ions,
(ii) an acid and
(iii) an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

25. An immersion plating solution according to claim 24 also comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

26. An immersion plating solution according to claim 24 also comprising an oxidant.

Claims 27-31 (Cancelled).

32. A process for improving the solderability of a metal surface, said process comprising:

a). contacting the metal surface with an immersion silver plating solution thereby producing an immersion silver plate upon the metal surface; and thereafter

b). treating the immersion silver plated metal surface with a solution comprising an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

33. A process according to claim 32 wherein the silver plating solution comprises a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives and benzimidazole derivatives.

34. A process according to claim 32 wherein the silver plating solution also comprises an oxidant.

35. A process according to claim 32 wherein the metal surface comprises copper.

36. A process according to claim 35 wherein the silver plating solution comprises a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives and benzimidazole derivatives.

37. A process according to claim 36 wherein the silver plating solution also comprises an oxidant.

38. An immersion silver plating solution comprising an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

39. An immersion plating solution according to claim 38 also comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

40. An immersion plating solution according to claim 38 also comprising an oxidant.

IX. EVIDENCE APPENDIX

Pages 507 and 508 from Hawley's Condensed Chemical Dictionary
(1993)

X. RELATED PROCEEDINGS APPENDIX

None